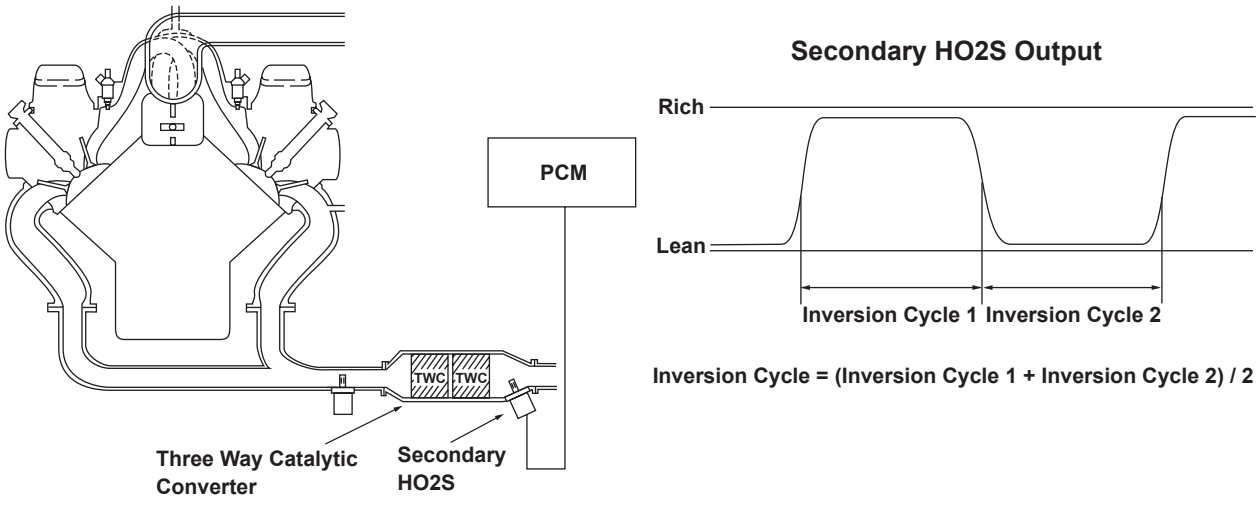
Advanced Diagnostics

DTC P0420: Catalyst System Efficiency Below Threshold (49states model)



P0420-9873

General Description

The three way catalytic converter (TWC) is installed in the exhaust system. The TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO2), and dinitrogen (N2) simultaneously. The TWC adsorbs/releases oxygen during this process. This ability to adsorb oxygen deteriorates as the TWC performance deteriorates. The oxygen content after passing through the TWC can be monitored according to the inversion cycle of the secondary HO2S (Sensor 2). The powertrain control module (PCM) determines fuel feedback control by monitoring the secondary HO2S, and then calculates the average time of the inversion cycle of the secondary HO2S, whose waveform alternates between rich and lean. If the calculated cycle time is shorter than a predetermined time, the TWC performance is considered to be deteriorated and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO2S
Duration	8 seconds or more
DTC Type	Two drive cycles, MIL ON

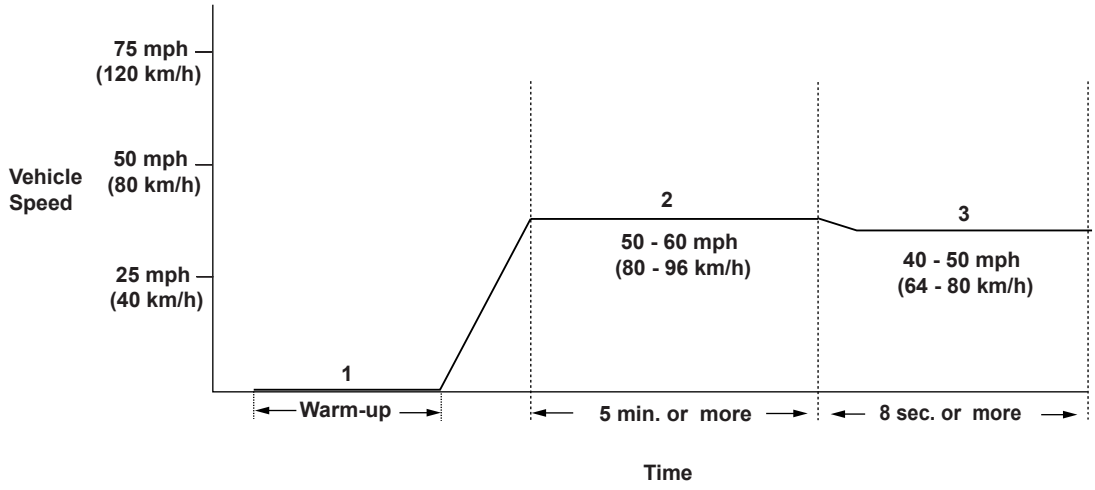
Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	158ºF (71ºC)	212ºF (100ºC)
Intake air temperature	32ºF (0ºC)	—
Engine speed	1,050 rpm	2,250 rpm
MAP value	24 kPa (180 mmHg, 7.1 in.Hg)	64 kPa (481 mmHg, 18.9 in.Hg)
Vehicle speed	26 mph (41 km/h)	62 mph (100 km/h)
Fuel trim	0.73	1.47
Fuel feedback	Closed loop	
No active DTCs	PCM, Primary HO2, Primary HO2S Heater, Secondary HO2S, Secondary HO2S Heater, MAP, CKP, ECT, TP, CYP, IAT, EGR, BARO, VSS, VTEC System, Fuel System	
Other	The TWC temperature is high enough	

Malfunction Threshold

The inversion cycle time of the secondary HO2S is not more than 5.7 seconds.

Driving Pattern



P0420-9851

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 50 - 60 mph (80 - 96 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 40 - 50 mph (64 - 80 km/h) for at least 8 seconds.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

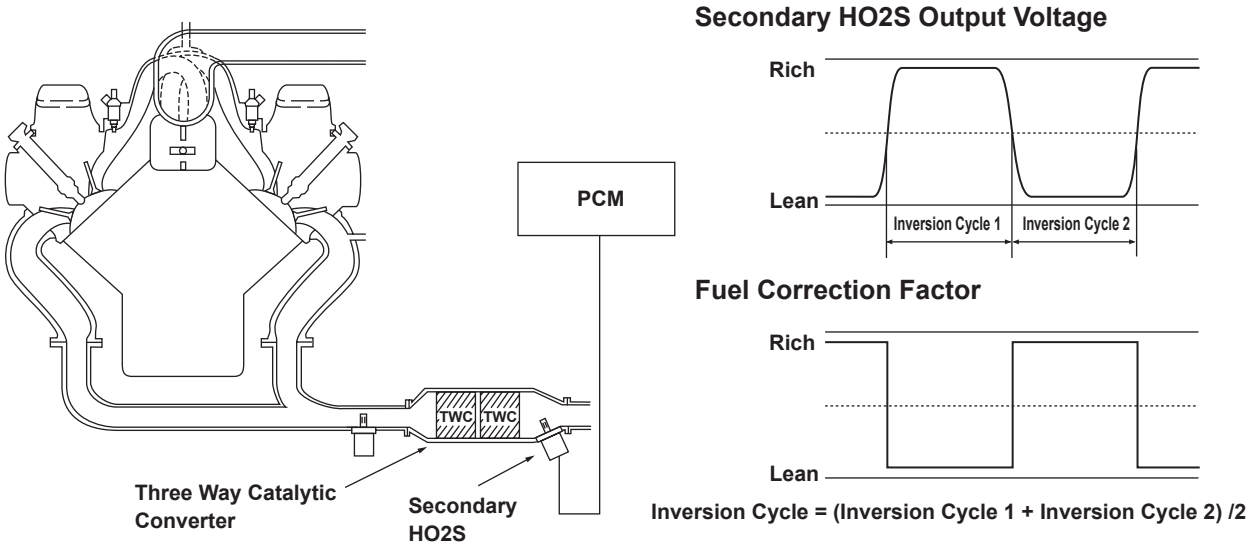
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the PCM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0420: Catalyst System Efficiency Below Threshold (California model)



P0420-9872

General Description

The three way catalytic converter (TWC) is installed in the exhaust system. The TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO2), and dinitrogen (N2) simultaneously. The TWC adsorbs/releases oxygen during this process. This ability to adsorb oxygen deteriorates as the TWC performance deteriorates. The TWC performance correlates with the storage capacity for oxygen, so the TWC deterioration can be detected by monitoring the storage capacity for oxygen. Also, the storage capacity for oxygen can be monitored according to the inversion cycle of the secondary HO2S (Sensor 2) which detects the oxygen content after passing through the TWC.

The powertrain control module (PCM) determines fuel feedback control by monitoring the secondary HO2S for a set time period, and then calculates the average time of the inversion cycle of the secondary HO2S, whose waveform alternates between rich and lean. This inversion cycle varies by the amount of the exhaust gas entering into the TWC and needs to be regulated by the OSC INDEX (Oxygen Storage Capacity INDEX):

OSC INDEX = The inversion cycle of the secondary HO2S x (times) the amount of exhaust gas during calculation of the inversion cycle.

The PCM calculates the moving average of six drive cycles and compares it to the predetermined threshold in the PCM. If the latest moving average is cleared by resetting the PCM, each threshold is applied according to the number of drive cycles until the moving average of six drive cycles is evaluated. If the calculated value is less than the threshold, the TWC performance is considered to be deteriorated and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO2S
Duration	8 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

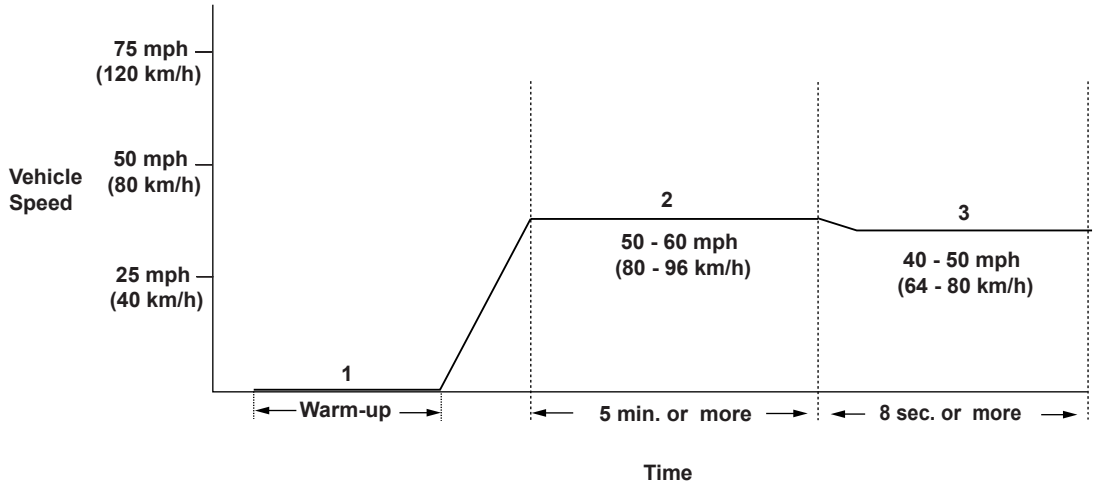
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (71ºC)	212ºF (100ºC)
Intake air temperature	32ºF (0ºC)	—
Engine speed	1,050 rpm	2,250 rpm
MAP value	24 kPa (180 mmHg, 7.1 in.Hg)	64 kPa (481 mmHg, 18.9 in.Hg)
Vehicle speed	26 mph (41 km/h)	62 mph (100 km/h)
Fuel trim	0.73	1.47
Fuel feedback	Closed loop	
No active DTCs	PCM, Primary HO2S, Primary HO2S Heater, Secondary HO2S, Secondary HO2S Heater, MAP, CKP, ECT, TP, CYP, IAT, EGR, BARO, VSS, VTEC System, Fuel System	
Other	The TWC temperature is high enough	

Malfunction Threshold

OSC INDEX is the value shown in the table or less.

The number of detections	OSC INDEX
1 time	4,608
2 times	3,582
3 times	3,030
4 times	2,888
5 times	2,814
6 times or more	2,763

Driving Pattern



P0420-9851

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Diagnosis Details

Conditions for illuminating the MIL

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